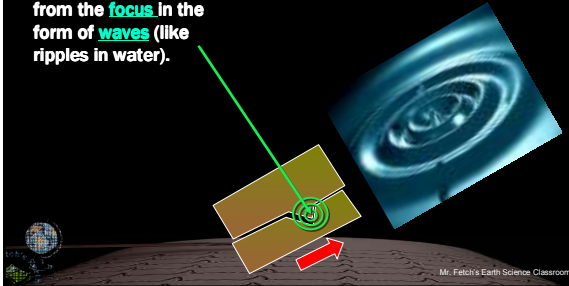


## Seismic Waves

When there is **movement** at a fault, **energy** is released:

The shaking occurs as the **energy** travels out from the **focus** in the form of **waves** (like ripples in water).



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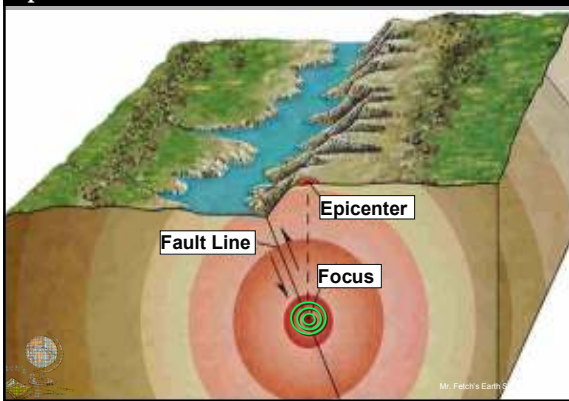
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## Epicenter and Focus



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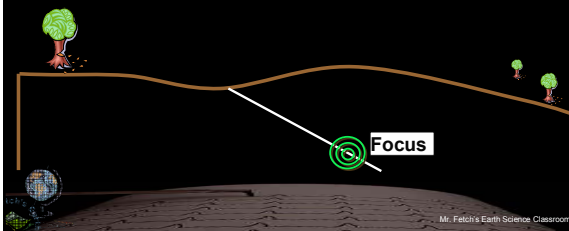
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## Focus

### Focus

1. The **focus** is the **starting point** of an earthquake.
2. It is where the rock actually **snaps** and motion occurs.
3. Most of the time it is **underground** (at least 65km down).



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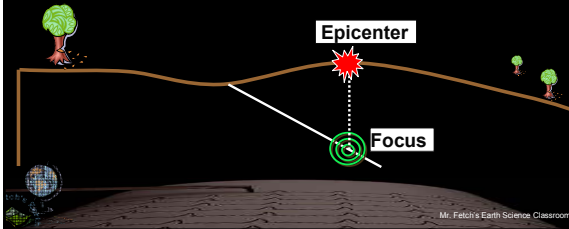
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## Epicenter

### Epicenter

1. The spot on **Earth surface** directly **above** the **focus**.
2. This spot experiences the **most energy** during the earthquake.
3. After an earthquake, its **position** given by the **epicenter** location.



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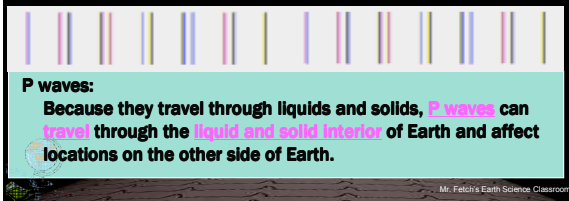
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## Seismic Waves: P WAVES

### P waves (Like a slinky)

1. **Primary waves:** Arrive at a location **before** any other waves.
2. **Phasestest waves:** travel at the **highest speed**.
3. **Push-pull waves:** **pushes & pulls** at rock as it travels through it.
4. **Pass through solids & liquids:** travels through magma.



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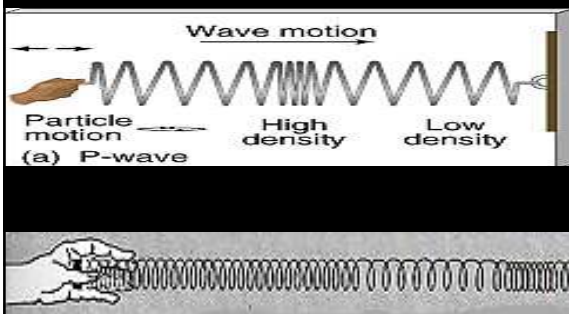
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## Seismic Waves: P WAVES



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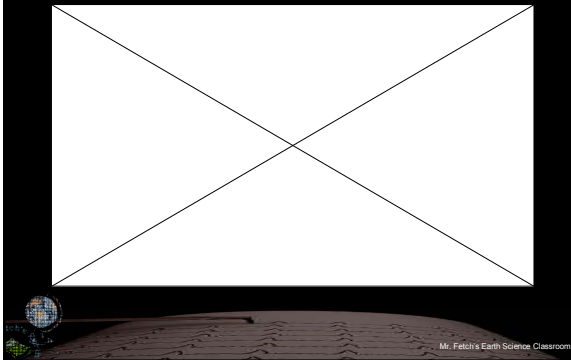
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## Seismic Waves: P WAVES



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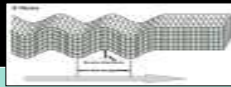
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## Seismic Waves: S WAVES

**S waves (Like shaking a rope)**

1. **Secondary waves:** Waves that arrive **second** at a location.
2. **Slow waves:** travel at the **slow speeds** (about  $\frac{1}{2}$  of P waves).
3. **Shake waves:** vibrate and move **up and down**
4. **Solids-only waves:** travels through **solid rock only**.



**S waves:**

Because they travel through **solids ONLY**, the S waves do not travel to the other side of Earth. When they **hit the liquid** magma interior of Earth, they **stop**.

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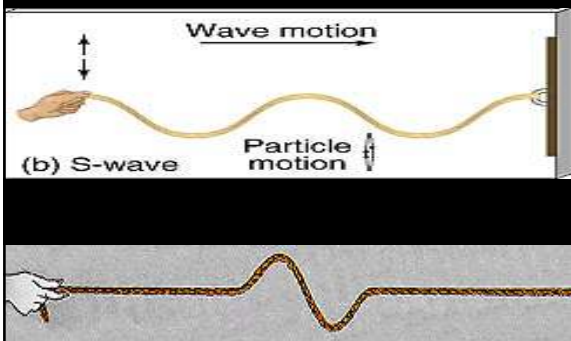
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## Seismic Waves: S WAVES



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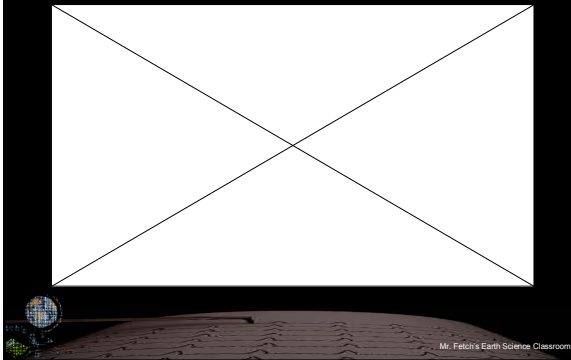
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### Seismic Waves: S WAVES



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### Seismic Waves: SURFACE WAVES

Surface waves (Like ripples in water)

1. Waves that propagate through Earth's **surface**.
2. They are the **slowest** type of waves.

**THEY ARE THE MOST DESTRUCTIVE !!!**



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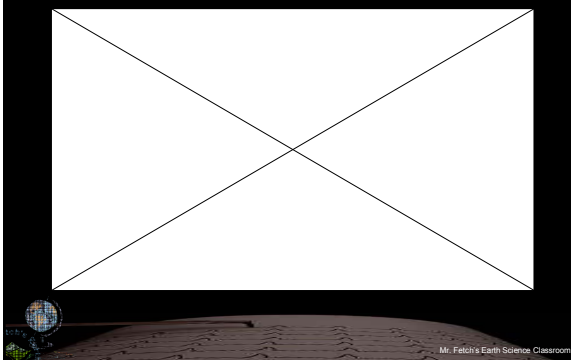
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### Seismic Waves: SURFACE WAVES



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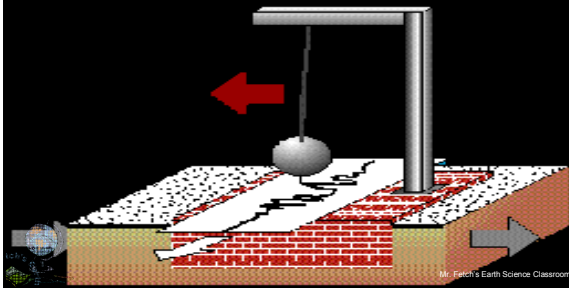
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## Seismic Waves

We measure all of these waves using a **seismograph**.

1. It draws a **zigzag** pattern that depicts the seismic **waves**.
2. It creates a print out called a **seismogram**.




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## Seismic Waves




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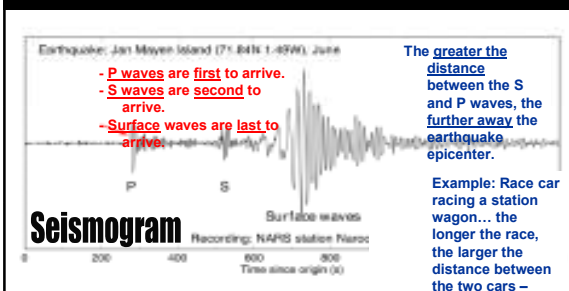
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## Seismic Waves

By looking at the seismogram, two conclusions can be made.

- **Speed** of the waves.
- **Distance** to the Earthquake **epicenter**.




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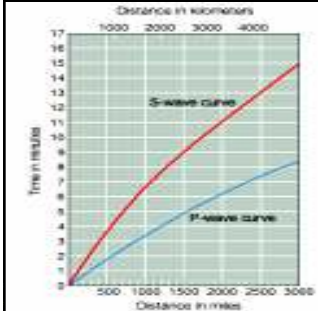
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## Seismic Waves

What if you want to find the **distance to an epicenter**?

- Use a **time-travel-graph**.
- It shows the average travel times for P and S waves.



1. Find the time between the P and the S wave (either from the seismogram, or it may be given to you).

2. Use the time-travel graph and find the spot on the graph where the S and P waves are separate by the time you found in step 1 above.

3. Drop a line straight down at the location and read the distance off the graph.

Mr. Felton's Earth Science Classroom

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## Seismic Waves

What if you wanted to find **WHERE** the earthquake occurred?

Once an earthquake occurs, you can determine its location.

1. **3** seismograph stations must pick up the waves.
2. Using the **arrival time** of waves, the station can say that the earthquake occurred within a certain **radius**. (distance)
3. Once 3 stations **map out the radius**, the **exact epicenter** is where the 3 circles intercept each other.

HERE IS HOW IT WORKS !!!



Triangulation:  
Commonly used by geologists to find the locations of Earthquakes.

Mr. Felton's Earth Science Classroom

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1. WHERE IS THE FOCUS LOCATED?

2. WHERE IS THE EPICENTER LOCATED?

3. WHAT WAVE GETS TO A RECORDING STATION FIRST AFTER AN EARTHQUAKE?

4. LABEL THE 3 TYPES OF WAVES AT POINTS A, B, & C.

5. WHICH EARTHQUAKE IS CLOSER TO YOU?

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